Incredible BAT Machine
TECH SUPPORT
DATA SHEET 4020

How To Calibrate Your Epson Printer & PhotoShop v7.x , vCS & CS2 & CS3 To Deliver Photo-Quality Printing For Windows 98/ME/NT/2000/XP/Vista Users

About Printers In General

It is now possible to produce photo-quality images from ink jet printers. While Epson, Canon and Hewlett Packard offer specific models that are capable of producing photo-quality output, as of this writing, archival inks are only available for some of the Epson models. Therefore, at this time, ColorBAT only offers full tech support for Epson models. Some of these models are available for as little as $100.00 retail. If you are in doubt about which model is best for you, contact ColorBAT.

All printers have specific driver-software that is included with them when they are sold. Also, there are drivers for a lot of printers included within Windows-95/98/NT/2000/XP. Companies that manufacturer printers are frequently up-grading their driver. The most recent driver up-grade is almost *never* found within the Windows Operating System.

The fastest, easiest way to get the most recently available driver for your printer is from the manufacturer's Web Site. Be sure that you know the version number of the driver that you already have before you log onto the Web Site. It will then be easy to determine if the version of the driver that is available on the Web Site is newer than the version that you already have.

If you do not have access to the Web, contact ColorBAT. For a small fee, we will be able to down-load the current driver for you and send it to you on a CD-ROM.

Almost all printer drivers for the "better" Epson models have included within them some provisions for selecting different printing "quality" modes. Be sure that you have set up the driver to deliver the best possible quality. If you don't understand the various setting options available within the driver, consult either the printer manufacturer of contact ColorBAT for help.

About Adobe's Photoshop

Photoshop is a very complex program that is used by many different professions. The truth is, photographers are a small *minority* of the folks who use Photoshop. The great majority of folks who use Photoshop are art agency people who are preparing images for eventual publishing in ink-printed magazines. Photoshop tries to be all things to all people. As a photographer interested in calibrating Photoshop to your printer, you are probably most interested in adjusting your system so that what you see on your monitor screen is what you will get from your printer (WYSIWYG). In YOUR case, your "printer" sits on the desk beside you. In the case of an art agency, their "printer" is a *company* located on the other side of town, or maybe in a different city!

With that in mind, you must understand that almost all of the instructions (concerning color calibration) contained in the HELP files and even on Adobe's web site are authored – not for you – but for the art agency guys who are outputting work for ink printing (offset – CMYK – printing… sometimes called lithography).

Further, Photoshop has the ability to provide output in one of several different forms: RGB, CMYK, and Grayscale, etc.

As a photographer, you are mostly concerned with the RGB method of output… unless, of course you are also providing files to clients who need to have the images offset printed (CMYK output). Of course, you may also be interested in printing black & white pictures. That will involve the use of the "Grayscale" mode.

These instructions are strictly for calibrating in the RGB mode. We will also provide instructions for printing in "Grayscale" mode. If you need to be able to output in CMYK mode, contact us at ColorBAT, or contact Adobe.

Almost all desktop ink jet, dye sublimation, and color laser printers require that Photoshop send to them a file that is in RGB mode for color printing. Do **NOT** attempt to send a file that is in CMYK mode for color printing. While the printer will certainly "work" with CMYK files, it will not, and can not, work *well*. You will *not* get good color quality from a CMYK file. CMYK files are for lithographers (offset ink printing).

If you need to print a B&W photo, the story is a little different. Some, older, printer drivers (especially the early Epson drivers) would not allow the printer to deliver "photo-quality" in the "monochrome" or grayscale mode. In order to get photo-quality, you HAD to operate the printer in its color mode. With those printers, you had to send an RGB file to the printer, even though the RGB file contained a B&W picture.

With most of the newer ink jet printers you can set the driver settings to deliver photo-quality in the monochrome (grayscale) mode. This allows you to convert your B&W image to "grayscale" in Photoshop and send the grayscale file to the printer.

If you have a choice, it is best to send a grayscale file to the printer if you want a B&W picture. Just be sure that your printer driver is capable of delivering photo-quality in its grayscale mode.

If you are working with one of the older printers that can only deliver photo-quality printing in its color mode, then when you send a RGB file of a B&W picture to the printer, you will have to be extremely careful to have the printer/monitor calibrated very accurately. Otherwise, the B&W picture will be printed with a subtle color cast… frequently a green cast.

About Paper and Ink

After you have installed the most recent printer driver, it will be "set" to its default settings. Be sure that you re-set it for photo-quality printing (usually NOT a default setting), and have selected the correct paper setting for the type of paper that you are using (also, usually NOT a default setting).

If you are printing with an ink jet printer, you should be printing on "glossy", "photo-quality" paper. Such paper is offered by many companies. At ColorBAT we are currently using paper from a company called Red River Paper Company. They are located on the web at: www.redriverpaper.com. Alternately, you can contact them at: PO Box 560145, Dallas, TX 75356-0145, 1-888-248-8774. They make a special paper that is "acid free", water-proof and available in glossy, matte and luster. It also comes in several different weights, and is available in all the standard sheet sizes as well as 100' rolls. For example, we buy 8.5 x 11 sheets for use in our Epson R200 printers and we buy 13" x 100' rolls for use in our Epson 2200 printer.

Of course, there are other companies that make paper also. We feel that if the paper is acid-free and water-proof those features will go a long way toward helping to achieve the longest possible life of the inks that are used. Then, in order to obtain the greatest possible life, we heat-laminate our prints before giving them to clients.

Epson offers a special material for ink jet printers called "**Epson Ink Jet Canvas Cloth**", S041132. It is available in rolls measuring 16.5 inches x 9.84 feet (420mm x 3 meters). It can be used in most of the Epson ink jet printers. Such "canvas" material is also available from many other companies that sell ink jet paper, including Red River Paper Company.

If you are printing with a dye sublimation printer, you MUST use the special, dye sub, paper that is made for your printer.

All testing and calibration MUST be done with the type of paper that you intend to use for your best photo-quality output. The characteristics of the paper vary dramatically and can have a great impact on the quality of the finished image. Do NOT attempt to do the trial & error testing described below with "cheap" paper and then switch to the "good stuff" for the final output. It just doesn't work!

The exact type (brand) of ink that you are using also has an impact on color calibration. As of this writing there are several different brands of ink cartridges being sold for use with the Epson printers. Additionally, there are several different brands of bulk ink being sold for re-inking the cartridges and for use in "continuous flow" inking systems.

And, in recent months several different brands of so-called "archival ink" has become available for the Epson printers. The archival inks, when used with archival (acid free) paper are now offering in excess of 100 years of image stability.

What ever ink you are using, the calibration procedures described below will be specific to that specific ink. If you later change the **brand** of ink, you will need to re-calibrate for the new ink. A specific "calibration" is good only for the specific type of paper-and-ink combination being used. Each different combination will require a different calibration.

About Archival Ink and Paper

Several years ago we and other companies offered a pigmented, archival, ink that was very good. We still offer our "brand" of it which is now called ***Demon Drool-II, Demon Drool III and Demon Drool-K***. This is excellent ink and can be used on all Epson printers. However, if you are going to use it in ANY Epson printer other than the specific model of printer that was made to use it, it will be necessary for you to obtain a custom-made profile for that printer. Without a custom-made profile for the printer, you will NOT be very satisfied with the color quality. For custom-made profiles, go to: www.profilecity.com. A custom-made profile will cost a little over $100.00.

Recently, Epson has released several printer models (C80, C82, C84, C86, 2200) that use a "special" pigmented, archival, ink that they call UltraChrome. Since these printers were made especially for this ink, the drivers that come with the printer (from Epson) has the (needed) special profiling already built in. The printers deliver great color quality with no special profiling required. We now offer special empty cartridges that were made for re-filling for these printers and a special, "clone" ink that is a near-perfect match to the original Epson ink. Our private label brand of ink for these printers

Sources for Re-inking, Archival Ink and other Printing Supplies

Source for buying Canon brand papers, films & inks:
http://estore.usa.canon.com/

Source for pH testing pen that tests printing papers for pH:
http://www.lightimpressionsdirect.com

A good, general purpose, "archival" paper that has an excellent gamut, in acid-free and water-proof: Red River Paper, Dallas TX, 1-888-248-8774, http://www.redriverpaper.com

A good source for heat-laminating equipment and supplies:

USI Corporation
98 Fort Path Road
Madison CT 06443
800-243-4565
http://www.USI-Laminate.com

While we, here at ColorBAT, no longer sell continuous flow ink delivery systems to folks outside of our immediate service area, we still sell all the parts for them if you want to make your own. We also offer tons of instructions on our web site to help you make

is your own CFS. And, we offer special cartridges that have been designed for re-filling. They are made from clear plastic and have little rubber (removable) plugs to use to seal them. These systems reduce the cost of ink by about 85% over what buying cartridges would cost. Also, we are a good source for general information on ink jet printing, re-inking supplies, empty cartridges, syringes, tips, etc.

ColorBAT, 173 W. Frederick Street, Millersville PA 17551; 717-872-2183—colorbat@colorbat.com http://www.colorbat.com

Source for info on archival stability:
http://www.wilhelm-research.com

Source for ink jet over-spray (UV protection):
Sentinel Imaging
800-262-3343
http://www.inkjet.com

Source for heat lamination equipment & supplies:
USI, 98 Fort Path Rd, Madison CT 06443
800-243-4565
http://www.usi-laminate.com

called **Demon Drool**. Since our pigmented, archival "clone" ink (**Demon Drool**) is so close to the original Epson ink, you can use our ink in these printers without the need for any further profiling! Just use whatever color settings that you would have used for the original Epson ink.

The rest of these calibrating instructions apply to these Epson printers (C80, C82, C84, C86, C88, 2200, R800, R1800, and R2400) as well as all of the other Epson printers that are using dye-based ink, or our "clone" of Epson's dye-based ink which we call **Spider Spit.** Some common Epson printers that use dye-based ink are the 1200, 1270, 1280, R200, R220, R300, etc. These instructions will be very difficult to apply if you are using one of the Epson multi-function machines. Their drivers are not designed for quality photo printing.

About Color Management in General

If you want Photoshop to take your image and print it on an ink jet printer correctly, then you need to tell Photoshop a little about: 1) the color source of your picture; 2) the monitor that you're using to look at the picture; 3) the printer that you will be using; 4) the paper and ink that you will be using; 5) your personal preferences for color cast… warm, cool, neutral, etc.

In order to get Photoshop to display images accurately on the monitor screen, you can do one of two things: 1) use a very accurate measurement device known as a colorimeter sometimes called a "spider" (expect to pay anywhere from $300—$2000.); or 2) you can use a much less accurate, but still usable built-in utility called Adobe Gamma. On a PC computer, you'll find the Adobe Gamma icon in the Control Panel.

These instructions deal with option #2 above.

Adobe Gamma will offer you either a Wizard to guide you through the setting-up process, or let you do it manually. I'll give you directions for how to set up the Adobe Gamma manually in a little while. When you have completed the steps in setting up Adobe Gamma you will have created a "profile" for your monitor. A profile is simply a little piece of computer code (a tiny program) that tells the computer how your monitor displays color so that later, Photoshop will be able to use that "profile" to display your pictures as accurately as possible.

After you have the monitor set-up, it will be time to tell Photoshop about your desktop color printer. You also do that using another "profile". Unfortunately, Photoshop does not come with a step-by-step utility for doing that. You have two choices: 1) you can use the ready-made "profile" that was supplied with your printer and got installed when you installed the printer drivers, or 2) you can buy a profiling application ($50—$2000) and make a custom profile. Save your money! I will show you in these instructions how to use the ready-made profile that comes with your printer… and tweak it to compensate for any different paper and/or ink that you might be using. I'll also show you how to tweak the ready-made profile to compensate for any personal preferences that you might have about the color cast of your prints… such as warm, cool, neutral, dense or light, high or low contrast, etc.

Let's get started!

Setting Up The Monitor

The whole act of "calibrating" a monitor is the act of "dumbing it down". In its default mode a monitor displays a picture that is just too pretty to ever be able to come close to looking like a picture on a piece of paper. We will dumb down the monitor a bit.

Today, most CRT monitors are being phased out in favor of LCD or "flat screen" monitors. Some of the new LCD monitors work very well for photographic quality use. Others do not. When you buy an LCD monitor be sure to get one that has a "Contrast Ratio" of at least 600:1. If you can get a monitor with a contrast ratio of 1000:1 (and they are readily available) that is even better. But, do NOT try one that has a lower contrast ratio. You'll have color quality problems with lower contrast ratio monitors. And, yes, the higher ratio monitors do cost more.

To proceed to calibrate your monitor (CRT or LCD)…….

Be sure that you have correctly installed the full version (not the ELEMENTS version) of Photoshop on your computer.

All monitors have controls on the front that allow you to set the BRIGHTNESS, CONTRAST and COLOR. If your monitor is new-out-of-the-box it is probably set up correctly. You can leave it alone for the time being. If it is a little older, then you might want to be sure that the BRIGHTNESS is set up to a general HIGH level. CONTRAST should also be set up sort of high in order to produce a nice, bright, crisp picture. The COLOR controls should be adjusted so that the monitor creates a nice, neutral, shade of gray. If you have a selection for setting the color "temperature" of the monitor try setting it to 6300 Kelvin. Then, be sure that any neutral gray colors on your monitor are really "neutral". You might have to adjust the color guns a little to obtain a truly neutral appearance on your monitor if it is a few years old. Now that you have the monitor set-up, it is time to use Adobe Gamma to finish fine-tuning the monitor set-up.

Make sure that your monitor has been turned on for at least half an hour, to stabilize the monitor display. I use a ViewSonic, 21", LCD, VX2000, 600:1 contrast-ratio monitor driven by an 256MB AGP (ATI Radeon X300) video card. My monitor can be set to a resolution as high as 1600x1200, although I usually operate it at 1280 x 1024, with the ADVANCED setting of FONTS at the "large" setting option. *Not all video cards will permit Adobe Gamma to work. If Adobe Gamma does not "work" on your computer, you need a different video card.*

I cannot guarantee that these calibrating instructions will work well with inexpensive monitors driven by low resolution video cards. But, hey – anything is worth a try!

Set the room lighting at the level you plan to use. Avoid bright background lights; bright overhead lights; and brightly colored walls in the immediate area around your monitor.

Turn off any desktop "wallpaper" patterns and change the background color on your monitor to a light gray color. This prevents the background color from interfering with your color perception and helps you adjust the display to a neutral gray color.

Use the manual controls on your monitor to turn **up** the BRIGHTNESS and CONTRAST to their **maximum high settings.** Then OPEN Control Panel and find the Adobe Gamma icon. Double click to open it. **maximum high settings.**

Then OPEN Control Panel and find the Adobe Gamma icon. Double click to open it.
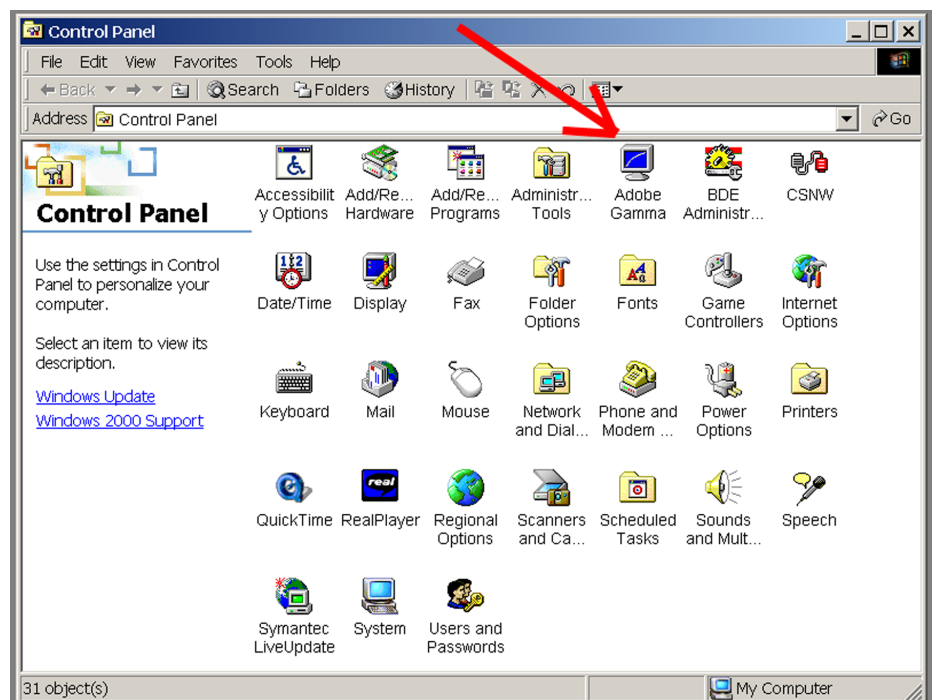
Next, it is time to tell Photoshop a little more about how you want it to deal

The ADOBE GAMMA dialog box is shown to the right. You can then click on either STEP BY STEP WIZARD or you can choose CONTROL PANEL. Click on the choice that is: CONTROL PANEL. Then click NEXT

Drag the slider bar (see red-colored arrows) back and forth until you can just barely make out different black & gray squares. If, when you drag this slider bar back and forth you do not see any change on your monitor screen, it is because your video card is not compatible with Adobe PhotoShop. You will not be able to perform a correct calibration on your computer until you install a compatible video card. ColorBAT currently recommends the ATI Radeon 9000 series, AGP video cards. Of course, there are others that will work just as well… and many that will not work at all.

In the image to the right there is a red-colored arrow pointing to the GAMMA adjustment. **Be sure that you get this set correctly**. If you do not set this adjustment correctly, you will loose the ability to see detail in the shadows and/or the highlights on your monitor.

Set the GAMMA (DESIRED) to Macintosh Default which will set 1.80 gamma. Set the White Point Hardware to 6500K (daylight).

After you have made a few test prints, you may have to come back to the gamma slider bar setting and make a fine-tuning adjustment in it in order to better obtain a match between the image on the monitor screen and the image from the printer. When you go to close this window, you will be given an opportunity to SAVE the settings that you have just made. Notice that I have SAVED my settings as" DCN_Oct1201". Do NOT save them over a profile that is already in the folder. Always use a NEW name to save your settings.
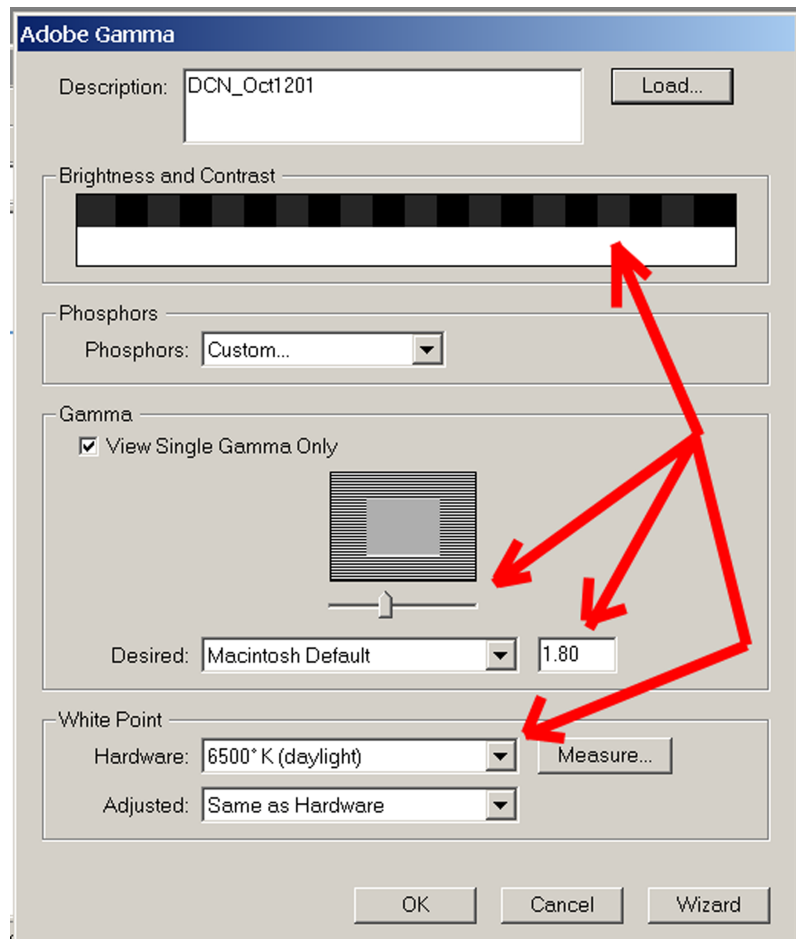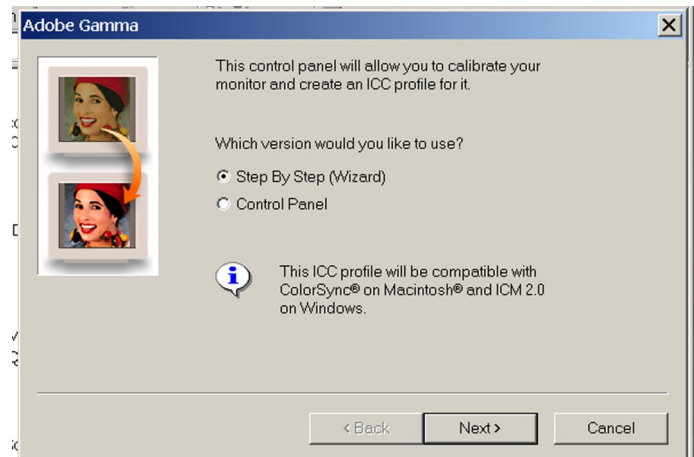
with color in general.

In Photoshop v7.0 (or later versions) go to EDIT > COLOR SETTINGS

In the WORKING SPACES area go to the RGB dialog box and select ColorMatch RGB.

In the CMYK dialog box, click on LOAD and then choose the selection that says U.S. Web Coated (SWOP) v2. If you are going to be doing a lot of CMYK work, this will probably need to be changed to something that more closely matches the lithographer's presses that you will have to interface with. Your lithographer should be consulted.

In the GRAY dialog box, set it to GRAY GAMMA 1.8. That is a standard, catch-all, setting.

In the area called COLOR MANAGEMENT POLICIES, set CMYK and GRAY dialog boxes to OFF. Set the RGB dialog box to CONVERT TO WORKING RGB. Be sure ASK WHEN OPENING is checked. Then, when ever you open a image that has never been SAVED in PhotoShop, the system will ask you if you want to convert the image to the current color space. In most cases, you will answer YES, and have the image converted to the current RGB color space which will be ColorMatch RGB.
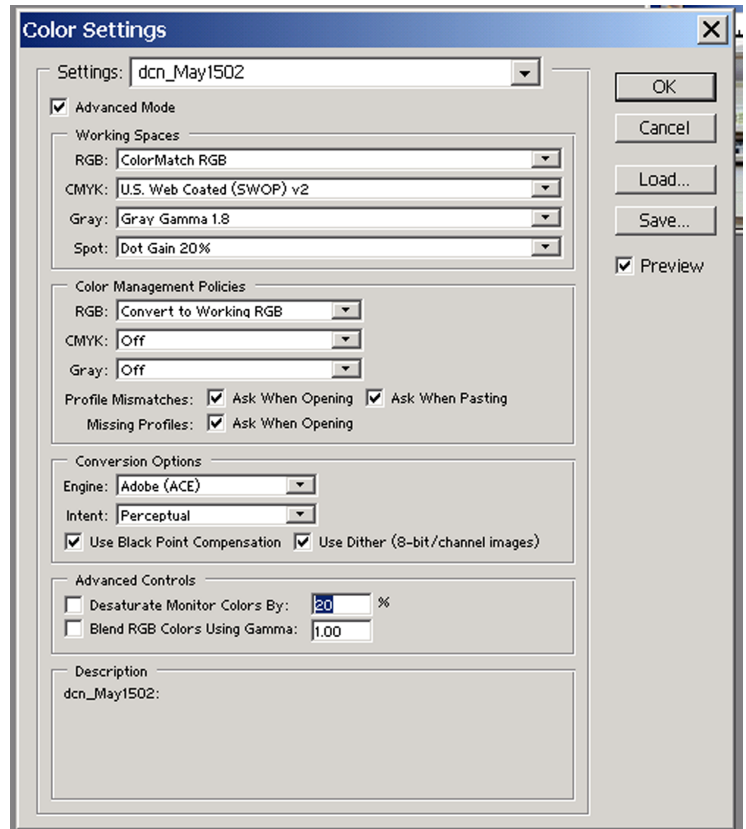
A brief note about some of the other options that are available for the RGB setting:

sRGB - This color space was designed as an "average PC monitor" RGB space for the World Wide Web. sRGB is a useful lowest-common-denominator output space for Web and multimedia images, which will be displayed on monitors of unknown characteristics. It is a good, catch-all, setting. (I just prefer ColorMatch RGB)

AppleRGB - This is basically the PhotoShop v2.0 default space. It is based on an Apple 13-inch RGB monitor and has a slightly wider gamut than sRGB. However, its 1.8 gamma is not perceptually uniform, so it tends to posterize shadows more quickly than sRGB.

CIE RGB - Has a very wide gamut – the primaries are all at the limit of human vision. That makes it unsuitable for work using 8-bit channels, because posterization will almost inevitable result. It also does a rather poor job of reproducing blue which goes black very quickly.

ColorMatch RGB is a special setting that is defined by Radius and matches the native color space of their Pressview monitors that are used with APPLE computers. It could safely be called a safe choice for print work.

NTSC - For many years NTSC was the standard for broadcast video in North America. It has a wide gamut and a very yellow white point. If you're working on images for broadcast video, NTSC is a rational choice.

PAL/SECAM - This is the standard for broadcast video in Europe and much of Asia.

SMPTE-240M - This is a proposed RGB space for HDTV (high-definition television).

**SMPTE-C** - The current US broadcast video-production standard.

Wide Gamut RGB - The primaries are the pure wavelengths of red, green and blue light. This space has a hugh gamut and will cause 24-bit files to fall apart due to posterization, particularly in the light greens. For adventurous folks who use a wide-gamut, 48-bit capture device, it may be a useful tool.

Simplified Monitor RGB - This is basically your monitor ICC profile. Think of it as the "work like Photoshop 4.0" option. Unlike all the other spaces offered, this one isn't device-independent, because it's tied directly to your specific monitor – it will be different on someone else's monitor.

Click on SAVE and give the "profile" that you have just created a name. In my example to the right, I have called my settings DCN_SETTINGS. Then click on SAVE.

That will take you back to the previous COLOR SETTINGS set-up window where you can click on OK to close it. This completes the settings that you need to make within Photoshop.

At this point, you have adjusted your monitor to deliver a good neutral performance for color; you have told Photoshop what color space (ColorMatch RGB) you will be using, and you have told Photoshop what to do if you attempt to open an image file that does not match the gamma of the color working-space… namely, it is to ask you what to do, and you will then, usually, tell it to convert the image to the RGB working space (which is now set to ColorMatch RGB).
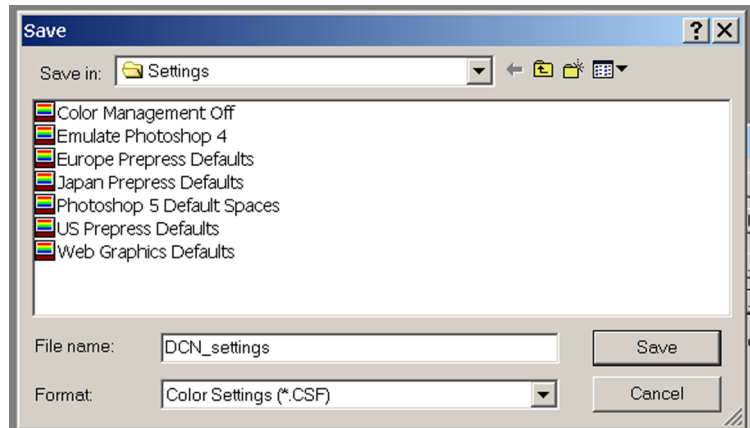
Now it is time to make some test prints, and perform a little fine-tune tweaking of the printer drivers.

In Photoshop, OPEN the .psd image (on the CD-ROM that you received from us) called "**Calibration_Image_1**". If you are asked by Adobe if you want to "convert" the image that you are opening. Answer "Yes" and let Adobe "convert" the image to ColorMatch RGB.

The test image, **Calibration_Image_1** should appear to be a nearly correct B&W image of a small child. It may appear slightly too dark or slightly too light. If it is only slightly in error, correct it by re-setting the Adobe Gamma settings. The Adobe Gamma settings are found by going to CONTROL PANEL > ADOBE GAMMA. If it is grossly in error, go back to the start of these instructions and start all over – you've done something very wrong.

The Image file, Calibrate_Image_1, is a PhotoShop .psd file that looks like the image to the right. The 4x5 (B&W) image is in RGB mode. It can be dragged from one corner to the other for making test prints.

After you have made one test print, you can run the same sheet of paper back through the printer and print the **image** in another corner of the sheet. Just drag the **image** to a different corner of the canvas before making the next print. This technique will allow you to make four test prints on one sheet of paper. The 4x5 image prints quickly and only uses 1/4 of a sheet of paper.
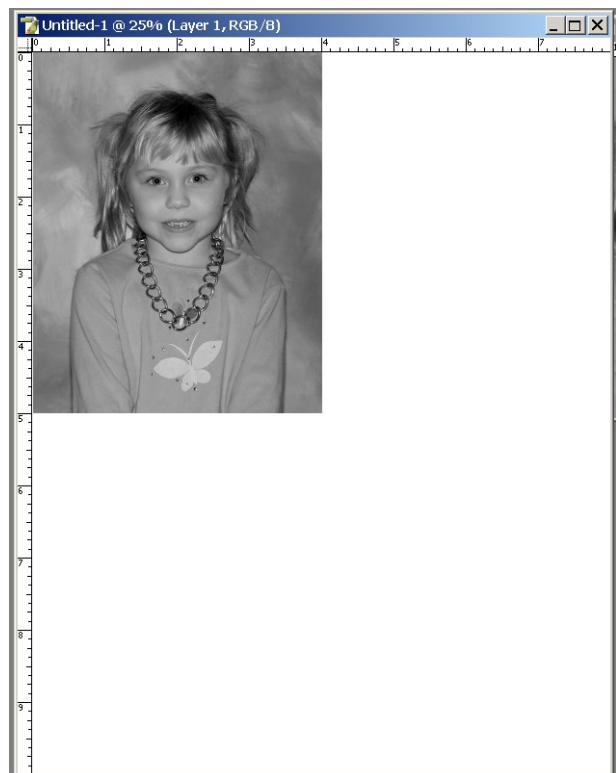
If you downloaded this document from our web site (and did not receive the CD-ROM) then you do not have the image **Calibrate_Image_1.** That's OK. Here is how you can MAKE an image to use for calibration purposes!

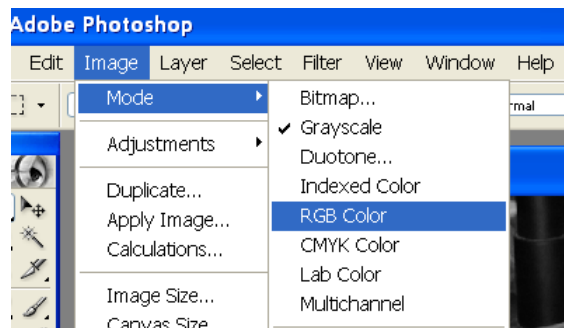1) Open any color image in Photoshop.

2) Go to IMAGE to MODE to GRAYSCALE. That will convert the color image to Grayscale
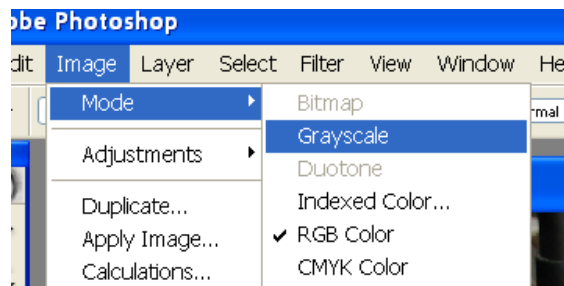
3) Now, the image will look like a B&W picture
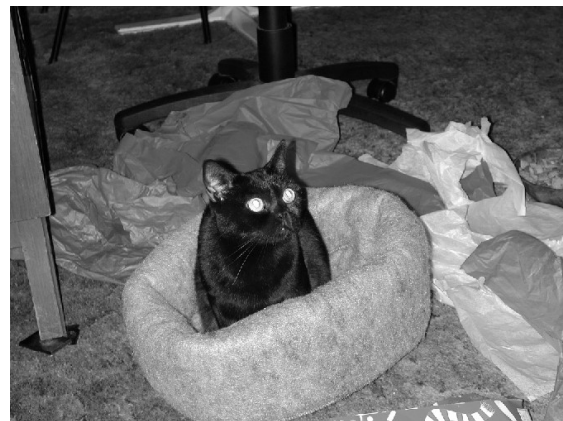
4) Next, go back to IMAGE to MODE to RGB Color and that will convert the picture back to an RGB file. However, the picture will still appear as a B&W picture on your monitor screen.

5) After converting the picture back to an RGB mode file, you might need to rotate the picture to a "portrait" presentation (vertical). Next, you will need to re-size the picture to something about 4x5 inches @ 300 ppi. If the picture is only3.5 x 5 inches that is OK. But, it MUST be set to a resolution of 300 ppi and it must be in "portrait" presentation (vertical).
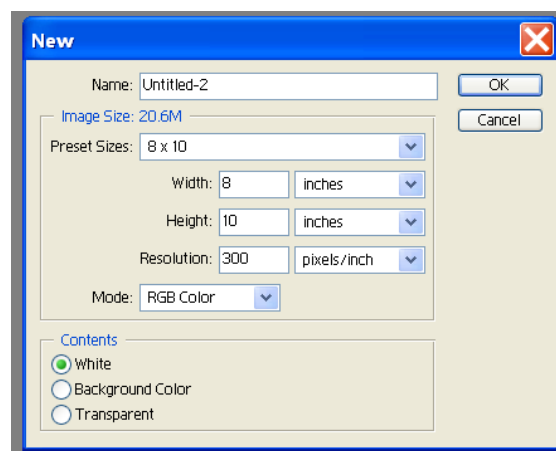
Next, create a new, blank, white canvas and be sure that it is set to RGB @ 300 ppi.

Now, drag the B&W picture (that is in RGB mode) onto the new canvas and position it in the upper, left-hand corner as shown to the right.
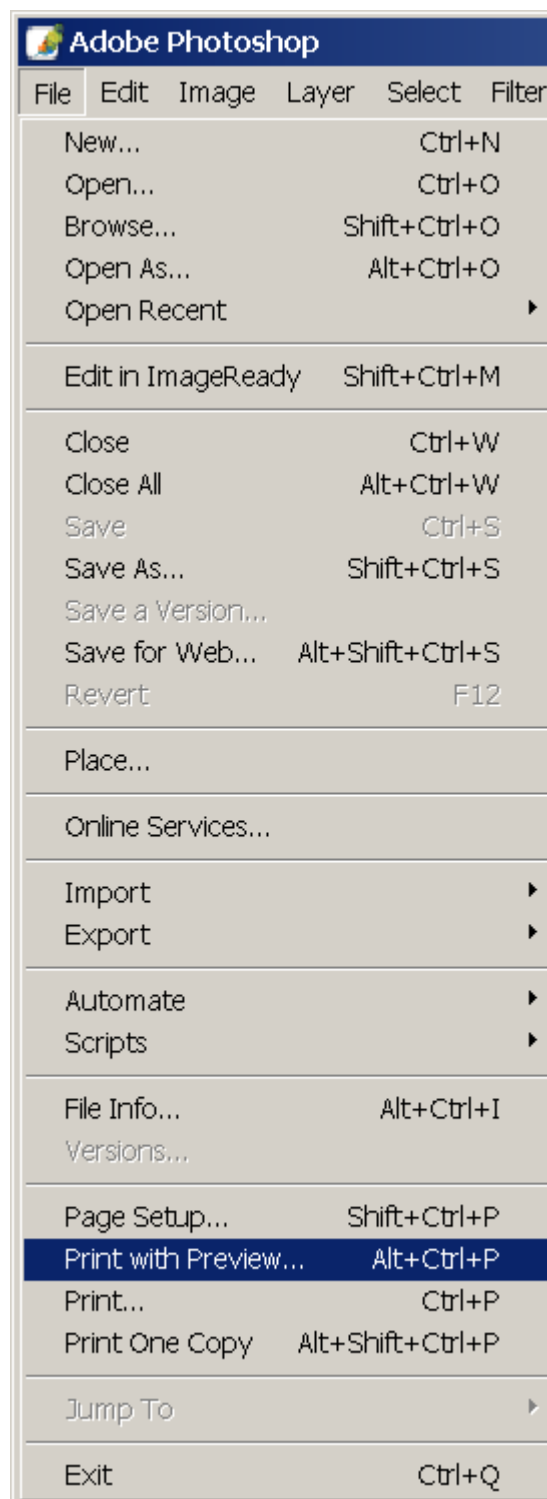
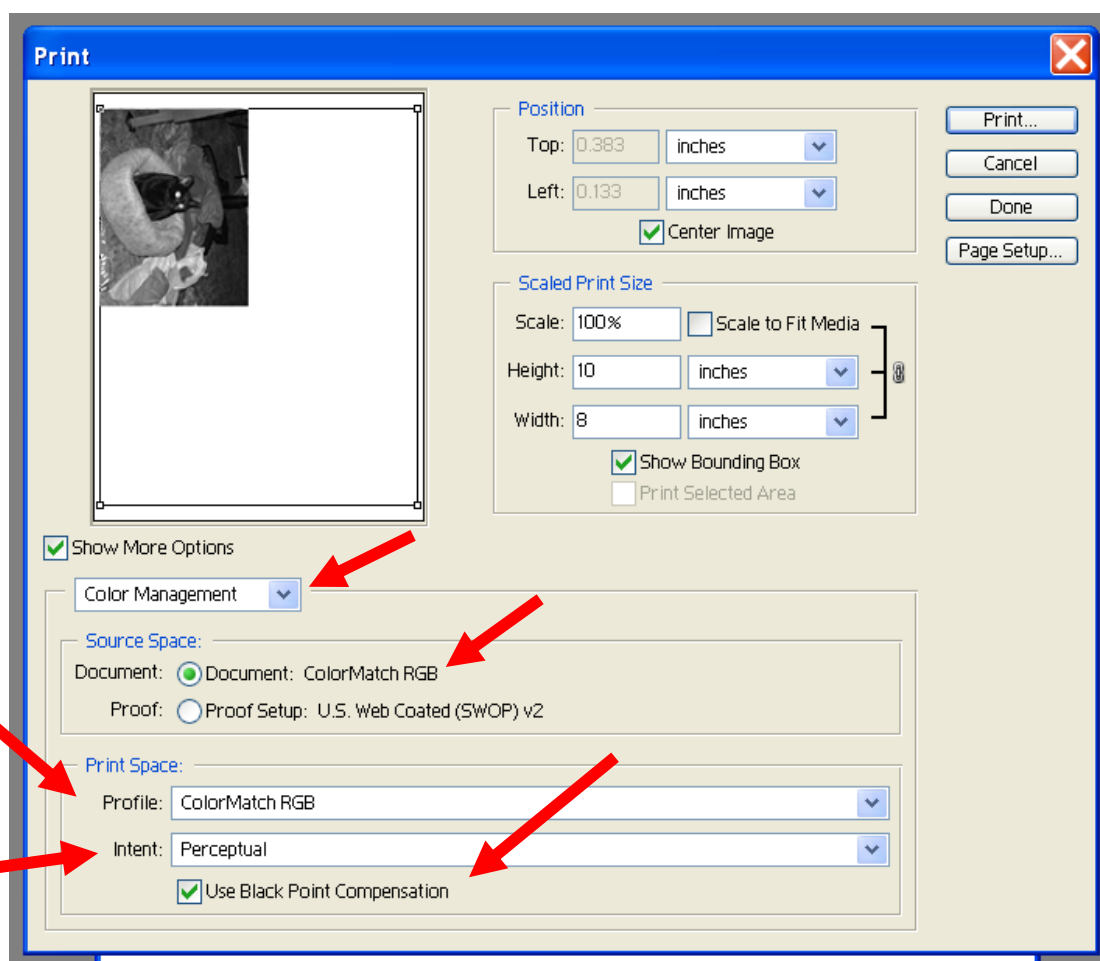PRESTO!! You have just created your very own calibration test image!

Wasn't that easy!

Now, you can go on to the next page in this document.

Next,, in Adobe PhotoShop, go to FILLE to PRINT WITH PREVIEW

That will bring up a window that will look like the one above. First, click on SHOW MORE OPTIONS. That will open up the bottom half of the window. Then Click on the arrow head and select COLOR MANAGEMENT.

Then, below that, be sure that there is a check on: DOCUMENT: COLORMATCH RGB

Just below that. In the area called PRINT SPACE, Profile,…... select ColorMatch RGB…. Or, with some of the newer printers (such as the R2400), set "Epson Stylus R2400" in this space. Try it both ways if you have problems. The correct setting depends on just WHICH model of Epson you are using. The older models used the ColorMatch RGB setting, the newer models of printers use the name of the printer.

Then select PERCEPTUAL for the INTENT.

Once these settings are made, they will stay that way, if Photoshop is shut down properly. You should not have to re-set these things the next time that you use Photoshop. However, until you are SURE that these things are remaining the way you have just set them, you might want to double check them each time you send an image file to the printer…. for a while.
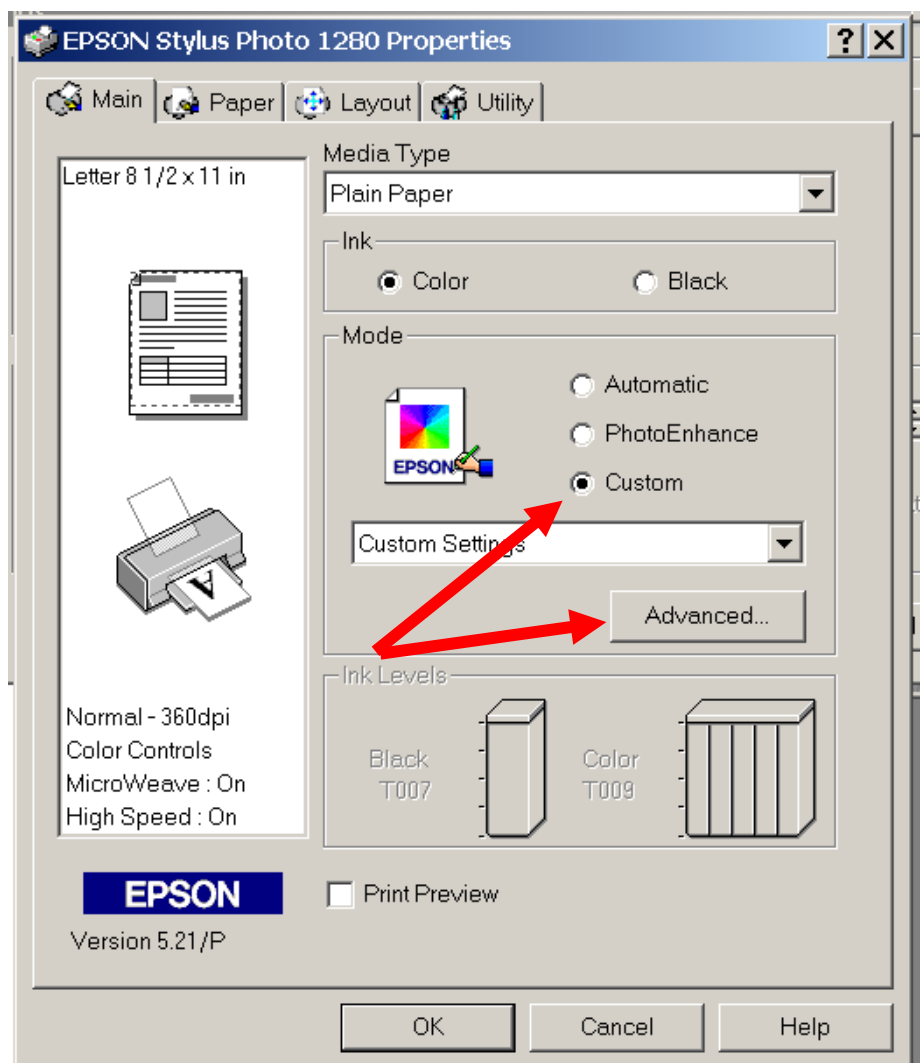
Next, click on the word, PRINT.
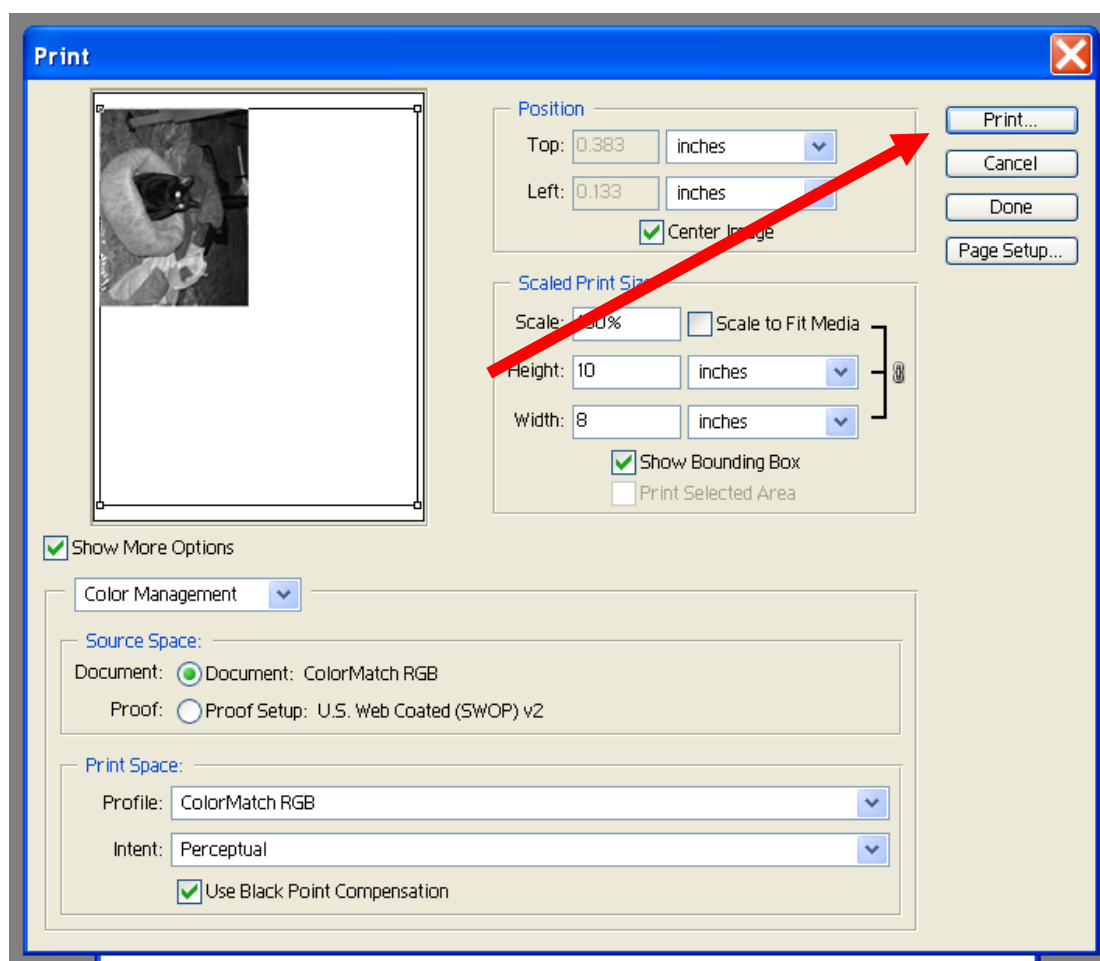
That will take you to this window, where you will click on the word PROPERTIES.

Be sure that you have selected the correct printer that you are wanting to use in the dialog box at the top of the window. (Some folks have several printers connected to their computer).
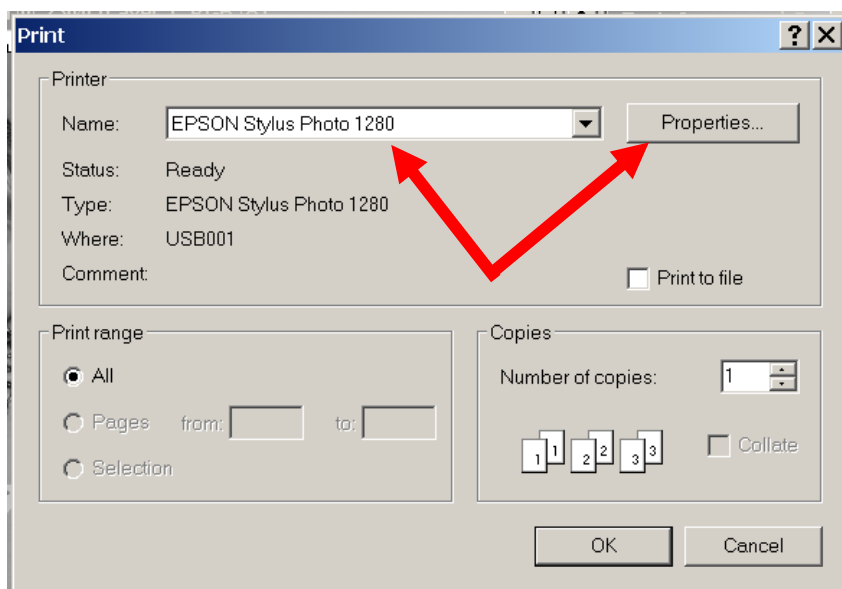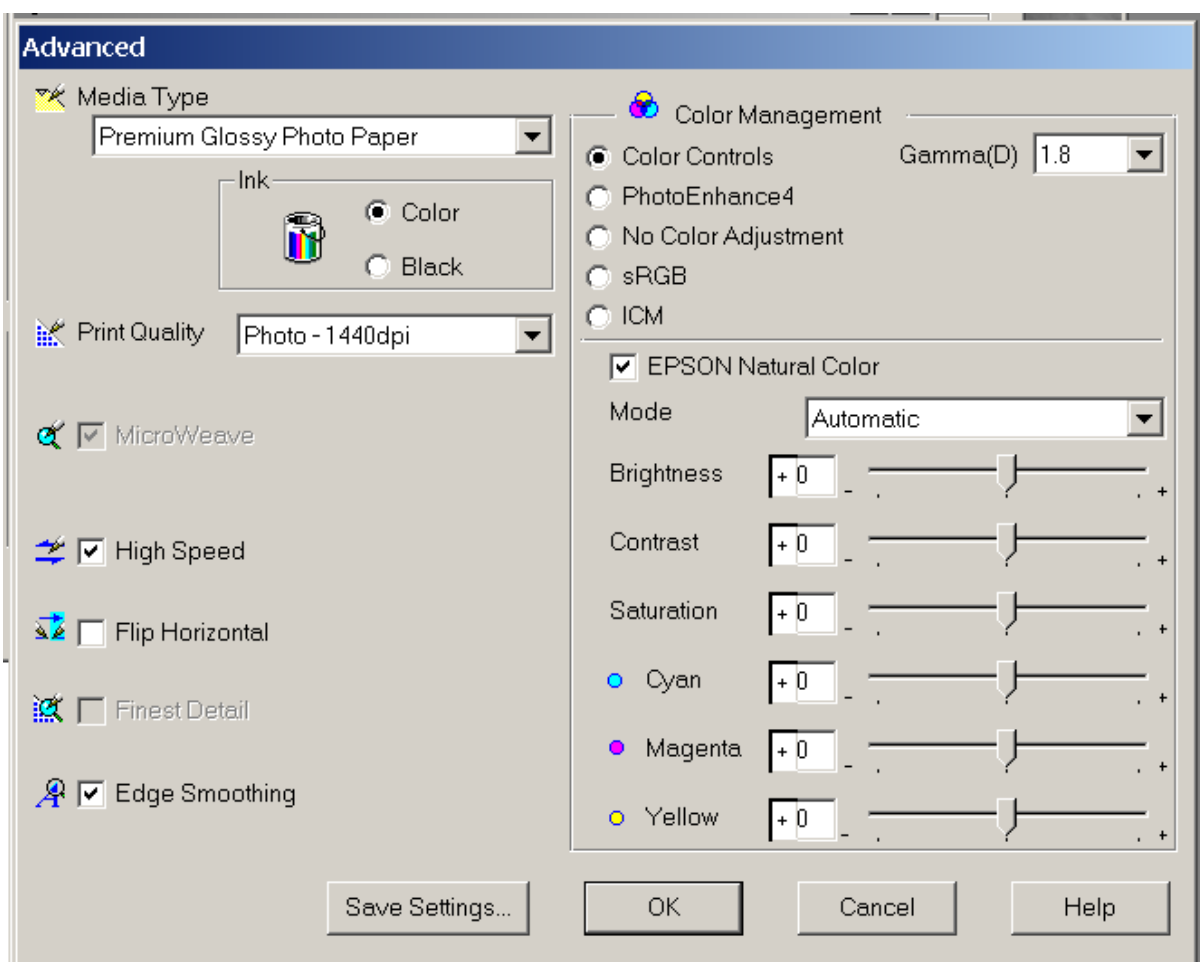
Click on the Mode "Custom", then click on "Advanced".
Depending on the model of Epson printer that you are using, this
screen may have a slightly different layout. But, just look for an
option to set to CUSTOM and a place to click on ADVANCED.

Notice that the ink cartridge icons in the picture above do NOT
show any ink in them. This is because the "screen capture" was
taken from a printer that is on a "network". If your printer is
connected "directly" to your computer, your ink cartridges
should display the amount of ink that is in them.

In the Advanced set-up box set the settings as follows:

Media Type: Photo Paper or Photo Glossy
Paper
Print Quality: Photo—1440 (or 2880 if it is available)

Advanced

Media Type
Premium Glossy Photo Paper ▾

Ink
◉ Color
○ Black

Print Quality   Photo - 1440dpi ▾

☑ MicroWeave

☑ High Speed

☐ Flip Horizontal

☐ Finest Detail

☑ Edge Smoothing

Color Management
◉ Color Controls   Gamma(D) [1.8 ▾]
○ PhotoEnhance4
○ No Color Adjustment
○ sRGB
○ ICM

☑ EPSON Natural Color
Mode   [Automatic ▾]
Brightness + 0
Contrast   + 0
Saturation + 0
○ Cyan   + 0
● Magenta   + 0
○ Yellow   + 0

[Save Settings...] [OK] [Cancel] [Help]

Halftoning: Error Diffusion (if it is available… in the picture above, it is not available… this varies with different models of printers)

High Speed - This is OK on some models of printers, but it will usually cause a loss of quality in photo-printing with most models of printers. Try it both ways if you want to.

In the **Color Management** area, be sure that Color Controls is checked, and that No Color Adjustment is NOT checked.

Below that, for the MODE setting, be sure that **AUTOMATIC** is selected.

The slider bars should all be in their default, "0" positions.

Now click on OK

Using these settings, make a test print of the **Calibrate_Image_1.PSD** or the test image that you created. When the print is finished, compare it to the image on the monitor screen. Try to evaluate two things… first, overall density of the print, and… second, the overall neutral gray tone.

When evaluating the overall density, ask yourself, "Is the photograph in the print lighter or darker than the image on the monitor screen?" What you are looking for is the same type of density judgment that you would look for in a wet darkroom… namely a best possible match for the *overall* density… not a specific match for a single element of the image. Look at the delicate highlights in the image and see if they are *reasonably* matched. Then, look at the deepest shadow detail that is still visible and see if that *reasonably* matches.

When evaluating the overall neutral gray tone, try to identify if the image is truly "neutral" gray or is there an errant color present? If there is a color cast present, what is it? Is the image too cyan? Or,, maybe it is too green. Maybe it is too blue. Can you tell the difference between an image that is too blue and one that is too cyan? If you cannot, you're dead in the water at this point. Try studying the sample images on the page 18.

Photographic Color Wheel
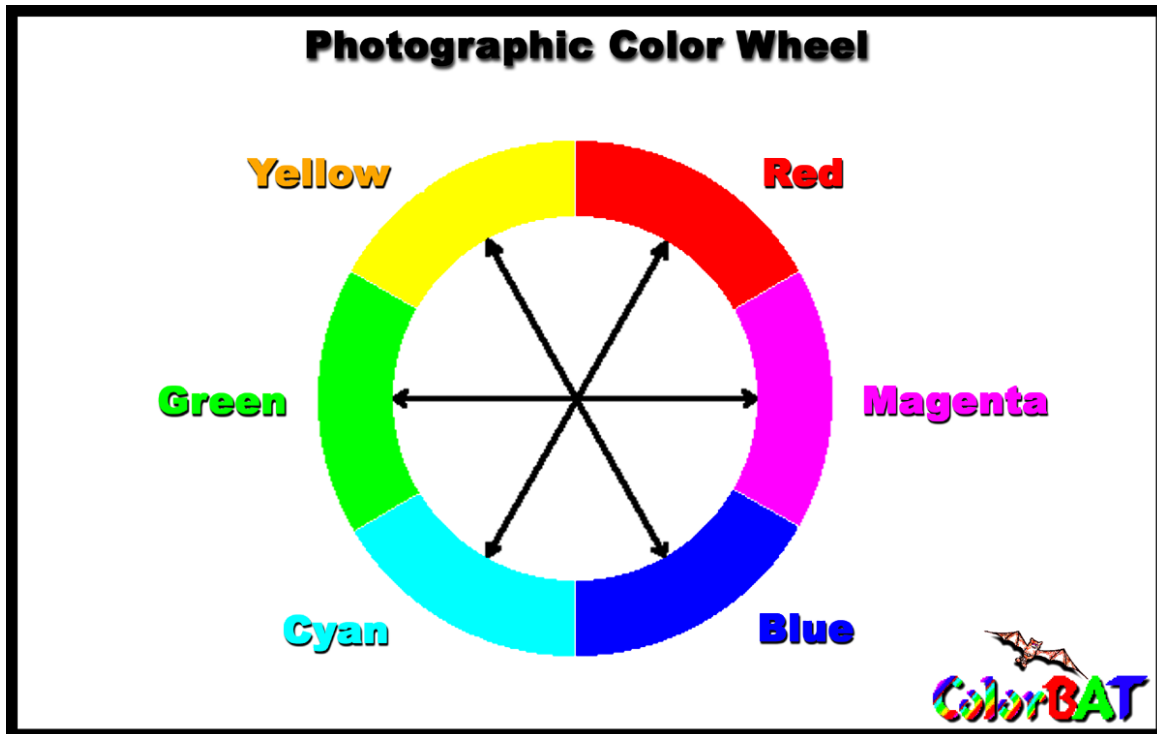
You simply MUST be able to recognize the difference between CYAN and BLUE… between CYAN and GREEN…. Between MAGENTA and RED…. Between YELLOW and RED…. etc, etc.

Study the Color Wheel pictured above. Try to understand that the Photographic Colors work together as "pairs". For example, RED and CYAN are a "pair". If you do something to INCREASE one of the pair, the other one MUST decrease by an equal amount… teeter totter style. GREEN and MAGENTA are a "pair". And, BLUE and YELLOW are a "pair".

The phosphor-generated color on the monitor screen cannot EVER "match" the ink-generated color on a sheet of paper. **This is an important thing to learn when working with computers and creating colors on the monitor screen that you hope to be able to print out on paper.**

Let's say that you "think" your print has a slight "green" cast in it. OK…. go to the slider bars shown on Page 14 and "remove" some of the GREEN, by sliding the MAGENTA slider bar a little to the "minus"…. Maybe 5 units. Then "SAVE" the settings. In the photo to the right,

Yellow and Magenta, when added together, produce RED.

Magenta and Cyan, when added together, produce BLUE.

Cyan and Yellow, when added together, produce GREEN.

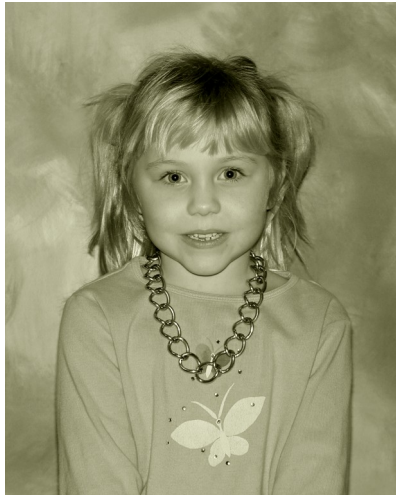YELLOW and BLUE are a teeter-totter pair

MAGENTA and GREEN are a teeter-totter pair
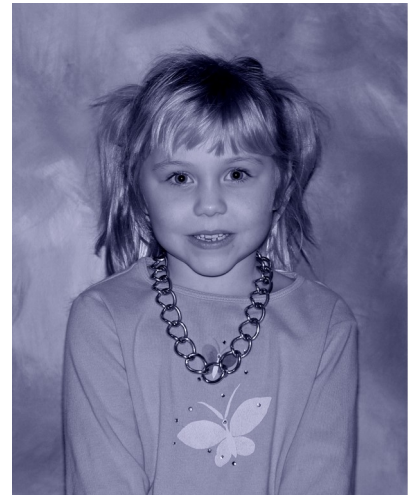
CYAN and RED are a teeter-totter pair

If one of the pair is INCREASED, the other one is automatically DECREASED and by an equal amount.
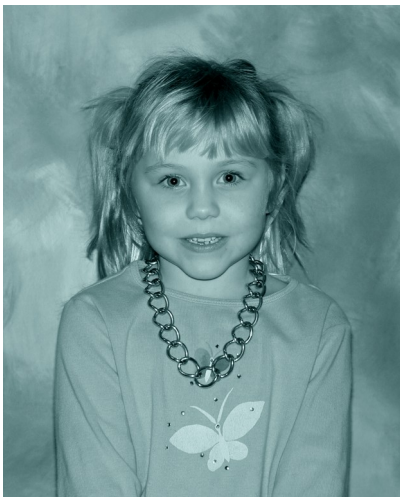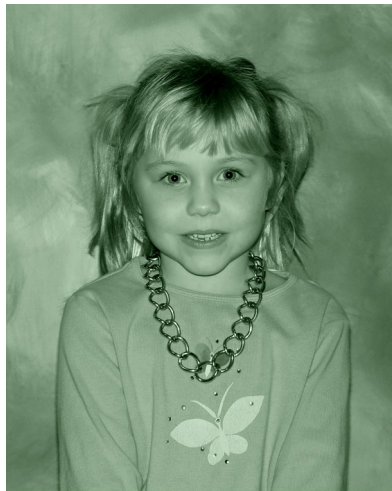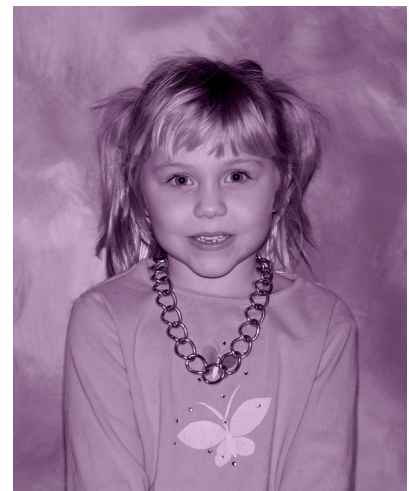
Neutral (correct)

Too YELLOW

Too BLUE

Too CYAN

Too GREEN

Too MAGENTA

These sample images may help you to recognize errant color problems in the test print.

Of course, the "error" in these samples is gross for demonstration purposes. The error in YOUR test print might be much less.

Too RED

I have given the name of GLOSSY_COLOR to the settings that I have SAVED.

Than, make another test print.

To make another test print, go back to the image shown on Page 9 and drag the 4x5 image over to the opposite corner of the 8x10 page… and put the same sheet of paper back in the printer.

Evaluate the second test print. Maybe you will need to move the slider bars again a little bit. Review the sample test images on Page 16.

If the test print is a reasonable match for the image on the monitor screen, then your system is calibrated and you can stop now. If your test print is not a satisfactory match to the image on the screen, continue to make additional test prints and further adjustments to the slider bars.

Accurate calibration at this point is a matter of adjusting the printer's control settings (the slider bars) to better match the image on the screen. It will take some trial & error experimenting… just like making "test prints" in a wet darkroom. But, once you have it set up correctly, you will not have to do it again, because then your prints from the ink jet printer will always be an exact match for what you see on the monitor screen.

You will need to make several test prints, and make small, tweaking changes in the color/density/contrast settings in order to zero in on the correct settings so that the printed image will match the image on the monitor screen. Take your time and do it right. This is similar to producing a "perfect print" in a wet darkroom. It requires a lot of pure trial & error testing.

A setting of "minus" Brightness will make the resulting print a little DARKER in density. A setting of "minus" CYAN will make the resulting print a little MORE RED (less CYAN), etc, etc.

Your act of calibrating is completed, when the B&W image of the small child appears to be truly NEUTRAL B&W. always view the test images under a good quality light such as DAYLIGHT. Do not use a yellow flood light (called an incandescent light bulb) And, do NOT use a GREEN flood light (called a fluorescent light). Such viewing lights will seriously distort your perception of color.

Custom Settings...

List:

Name: Glossy_Color

Save   Delete   Cancel
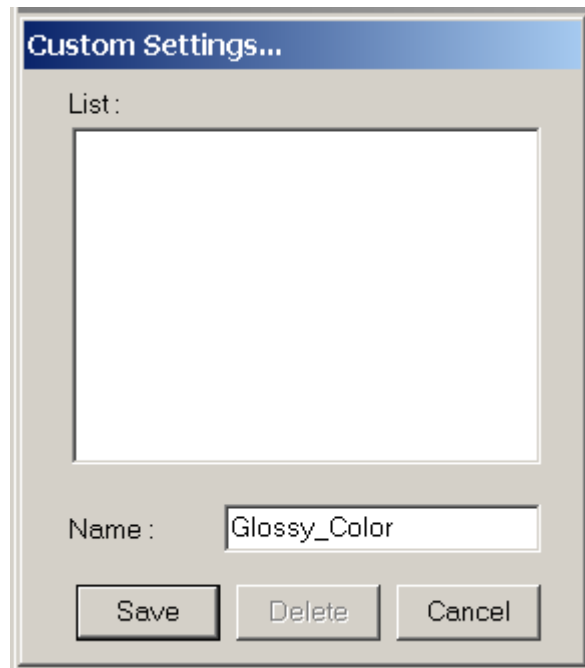
The slider-bar adjustments can only be set to a maximum of 25 units. Because we chose to use the "ColorMatch RGB" working space, the 25 units of adjustment will probably be acceptable for almost any type/brand of paper that you might want to use. However, sometimes—depending on a lot of different variables—the 25 units of adjustment might not be enough for the BRIGHTNESS setting (depending on how you set the Adobe Gamma setting when we first started this calibration procedure). If you find that you have reached the limit of the 25 units of BRIGHTNESS control and the print still does not match the image on the monitor screen for overall DENSITY, then go back to CONTROL PANEL and re-open Adobe Gamma and make a small tweaking change in the slider bar to cause the image on the monitor screen to become a little lighter or darker (whichever adjustment you need to better match your print). Then, continue making test prints and making fine-tuning adjustments of the slider bars.

If you feel that you need more than the 25 units of adjustability for the color settings, you are doing something very wrong. Stop and go back and review the steps.

While you can get very close to a perfectly neutral B&W image following these steps, you will probably never be able to get real perfection. Get as close as you can. Then, when you switch from printing a B&W image (all be it the image is set to RGB mode) to a real color image, the selection of slider bar positions will render the color image a near-perfect match for the image on the monitor.

If you really want to print a B&W image…. Then there are some procedures outlined below for that. We only use a B&W image (set to RGB mode) as a test image for calibrating color.

About Using Different Papers

I suggest that you choose one or two types of paper, calibrate for them, and stick with them, since every different type/brand of paper will need slightly different calibration settings.

As a hedge against a computer crash that might cause the settings to be lost, you might want to write them down some place. I use NOTEPAD and create a tiny little "readMe" file in which I record the exact settings that I wind up using. That way, if my C: drive ever crashes, and I lose these settings, I can easily re-create them from my ReadMe file that I always store OFF of the C: drive. If you don't have a second (or third) hard drive on your computer… ADD them sooner rather than later!! Store ALL of your data files OFF of your C: drive. The only thing on the C: drive should be the operating system and

your applications (such as Photoshop).

Any other combination of paper and ink (such as archival ink & paper… or a different brand of paper… or a different brand of ink...) will require a different calibration set-up… which I would give a different name, so that I can always select the correct settings for whatever paper and ink combination that I happen to want to use.

Printing B&W Images

First, within PhotoShop, be sure that the "MODE" of the image is set to GRAYSCALE.

Be sure that you have adjusted your B&W image to look the way you want it to look on the monitor screen. Now, the next job is to adjust the printer driver controls to reproduce what you have on the monitor screen. You do NOT want to make any further adjustments to Adobe Gamma because if you do, that will alter the way your color prints are handled. You've already set things up for correct color printing.

Take a B&W test image… any B&W image will do as long as it has a nice distribution of tone values… and is not a hi-key or a low-key image. Just a nice, average B&W image will do nicely.

Be sure that the B&W image is set to GRAYSCALE mode (not to RGB mode as we did above with the B&W image that we were using to calibrate the color slider bars).

Next,, in Adobe Photoshop, go to FILLE to PRINT WITH PREVIEW

Follow the steps on Pages 13, 14, 15, 16, 17, 18, & 19.

Notice that when you get to the screen shown to he right, you need to click on BLACK, meaning black printing (black ink ONLY) instead of color printing. When you click on BLACK, the color slider bars are grayed out and only the two slider bars that relate to B&W printing will remain. See the image to the right.

Just as you did when you were making test prints for color printing, you will now need to make some test prints for B&W printing.

After making each test print, decide if you need to tweak the two slider bars or not to make a better match between the image on the monitor screen and the resulting test print.

You can SAVE the settings so you will not have to remember them… just as you saved the settings that you used for color printing.

By the way, the newer printers, such as the R2400, handle B&W printing a little differently. Consult your Owner's Manual for exact details on B&W printing with the newer printers.

The Epson R800 & R1800 do not print B&W very well. They tend to leave a color tint in the images. They are NOT recommended for B&W printing… even with original Epson cartridges!

Do NOT go back and make any adjustments in the ADOBE GAMMA settings in the CONTROL PANEL because that would screw up the color printing calibration that you just did.

If you have reached the maximum of 25 units of BRIGHTNESS adjustment and the print is still not correct, then you will HAVE to go back and re-set the Adobe Gamma setting… and then you will HAVE to **re-do all the color adjustments.**

After you have given the settings a name, you will be able to select the name in the future from the CUSTOM settings dialog box (see the red arrow in the image to the right).
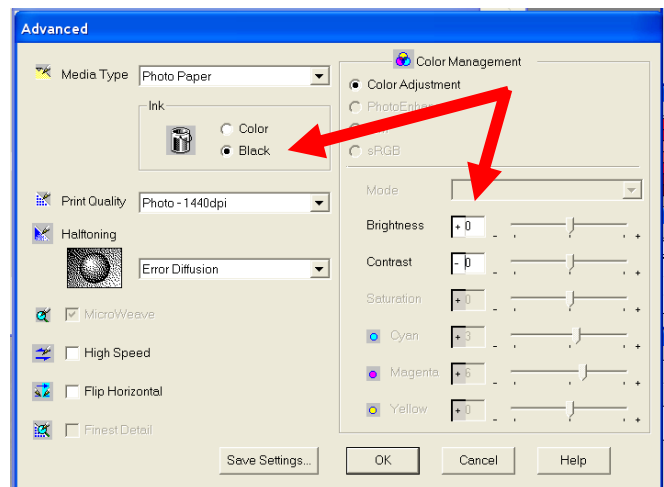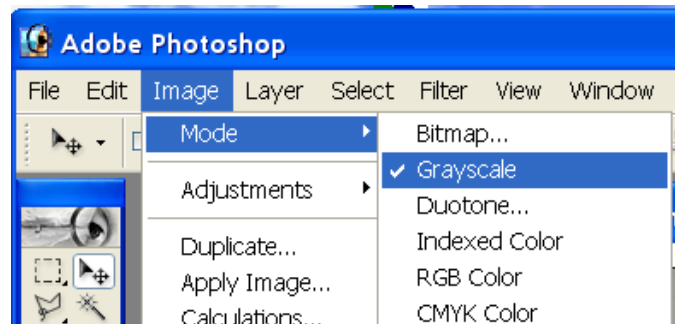
Make a note someplace of the final settings that you wind up using. This will allow you to re-set things if your system ever crashes and you lose all of the configuration files on your C: drive. It happens!

This is the place in the Epson driver where you can fine tune the color balance of your print.

Here is where you make fine-tuning adjustments to calibrate the output from your printer to match what you see on your monitor screen. If your printer does not have adjustments like these… you cannot calibrate your printer to match your monitor.

Although you will SAVE the color adjustments settings, I suggest that you also write down someplace the same information as a hedge against the time when your computer crashes and you lose all of the settings. It is a really major pain to have to do all the trial & error testing to re-create the calibration settings.
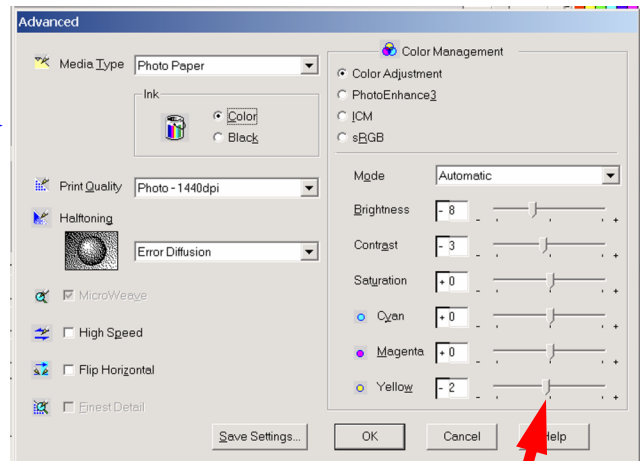
Some Final Pointers on Adjusting The Electronic File
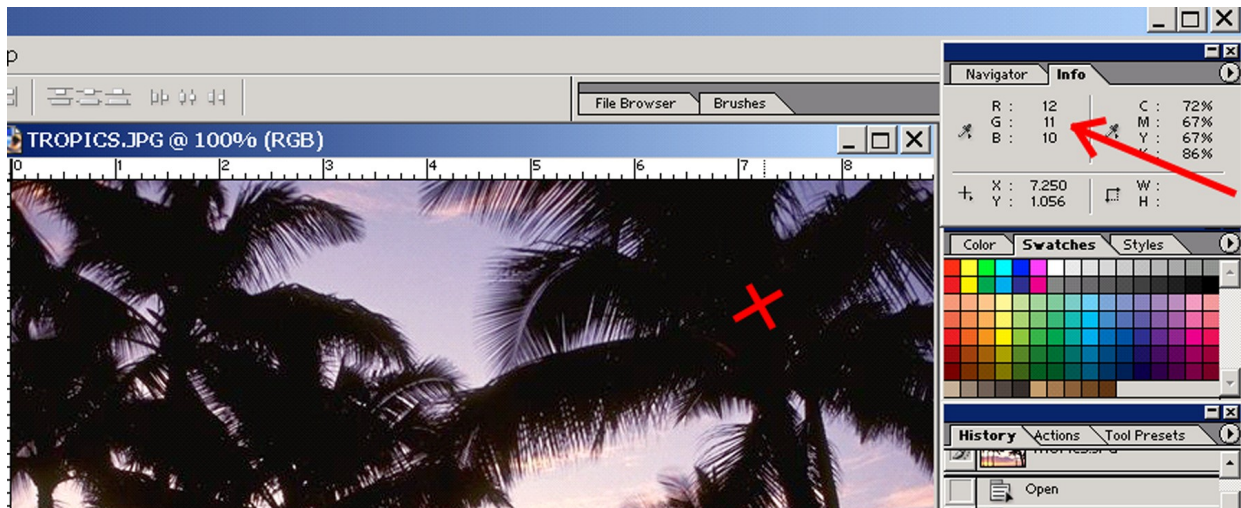
Before sending ANY file to the printer, take a minute to check the tone range and neutrality of the print. This is easily done with the INFO tool in Photoshop.

Place the courser in the darkest, area of the print. Select an area that you want to print as SOLID BLACK in the finished print.

Then with the courser in that area, check the RGB reading in the INFO tool. In the example above, the reading is 12, 11, 10.

That tells you that since the three colors, Red, Green & Blue are all within 2 units of each other, the area under the cursor (the red X in the photo) is almost perfectly NEUTRAL in color balance. If all three numbers were identical, then the area would be absolutely NEUTRAL (no color tint… black in this case).

Notice that the numbers are about 10 to 12 units. That is all that is needed in order to deliver solid BLACK in the print.

If these numbers read LESS than 10 –12 units…. You have "set" the overall DENSITY of the image too dark, and the highlights will be darker than they need to be. So, go to IMAGE to ADJUSTMENT to BRIGHTNESS/ CONTRAST and lighten the overall image until the darkest place in the image reads about 10 to 12 units.

If you rake an INFO reading in an area that should be BLACK, all three numbers should be within 4-5 units of each other. If they are not, that indicates that the shadow area has a tint of COLOR in it. The color might not show up in the print, since that area is going to be black. But, the fact that the color is there might indicate that your print is not properly color balanced. Such a slight "out of color balance" condition might not be apparent on your monitor screen, but it will probably show up in the print. It is a good idea to make slight, tweaking, color balance adjustments until you get INFO tool readings that are as close to each other as possible.

For example, if the INFO tool readings were: 15, 9, 8…. That would indicate a strong amount of RED color in an area that should be near-neutral. It would be a good idea to pull some of the red out of the electronic file before sending it off to the printer, even though the image on the monitor might look OK to you. The monitor and your eyes can fool you. But, the INFO tool never lies. If the INFO tool tells you that you have a tint of color in an area that SHOULD be neutral gray…. You can bet that the color tint will show up in the print, even if you can't see it on the monitor.

Remember if the INFO tool reads, 255, 255, 255 the area is perfectly WHITE… no tone value at all. You would like to avoid this in most prints. The very whitest area of a picture should have a tiny bit of tone value in it. Solid white (255, 255, 255) is referred to as "spectral" white. That is the shade of white found in "glare" conditions… such as the catch light in an eyeball from a flash gun, or the glare of the sun on the hull of a white sail boat.

If the INFO tool reads 0,0,0 the area is perfectly BLACK… maximum density (D-MAX). You would like to avoid this in most prints. The very darkest area of a print never needs to be much less than 10—12 units. If you "set" your electronic files to read 10—12 units in the D-MAX areas, the highlights will come out nice and bright.

# # #